

**Report on
Meteau Conference on Metals and Related Substances in Drinking Water
on 13th to 15th October 2010 at Kristianstad, Sweden.**

The Conference comprised of 35 presentations and 27 posters. The presentations were divided into sessions covering Risk management, Health and aesthetic issues, Mineral balance in drinking water, Treatment processes, Metal testing and leaching, Source water and Bottled water. However, this report extracts issues raised under headings more relevant to our industry.

A hard copy of the abstracts has been provided and a CD containing all the presentations has been requested.

1. Hardness Minerals

Frantisek Kozisekⁱ described the background to the WHO position, including the Baltimore conference and meta-analysis by Professor Paul Hunter, explaining that, after excluding the less reliable studies, no relationship between hardness or calcium with CVD was evident but an association between magnesium in drinking water and CVD mortality is statistically significant. He said that furthering of that benefit had been slow and hindered by the “water treatment industry”.

He went on to say that “the most recent hypothesis” suggests low mineral content water (with low buffering capacity) results in “acidosis” and poor mineral balance due to low bicarbonate content of the drinking water. This hypothesis was presented by Rylander at the Baltimore conference in 2006. He then described a recent pilot experiment with 4 men and 4 women testing urinary pH after 1 week with hard water and then 1 week with demineralised water. It showed no effect. He made several suggested reasons and made reference to the plausibility of “technology” supported from the Japanese Society of Functional Water. The obvious comments about size and duration of his trial were made during discussion.

Cindy de Jonghⁱⁱ’s presentation, which she prepared in conjunction with Margeet Mons (who presented at the Baltimore conference), described the recent cohort study in the Netherlands involving 120,852 men and women starting in 1986. The study gave no *overall* protective effect of higher tap water hardness, calcium or magnesium against CVD mortality. But for men with the lowest 20% of dietary magnesium intake, there was a lower risk of death from stroke with higher magnesium in their drinking water – however, it was the reverse, i.e. disbenefit from water magnesium, for women. The full report was published in Environmental Health Perspectives (Leurs et al, 1010) and a copy will be attached to these notes. Based on the current death rate from CVD in the Netherlands, she estimated that increasing Magnesium to 4 mg/l for the vulnerable population, could save 26 deaths annually. However, balanced against 20,000 deaths from smoking and 18,000 from obesity, the cost/benefit would be questionable.

Ingegard Rosborgⁱⁱⁱ’s presentation stated that “hard water is protective against a number of diseases” specifically mentioning calcium and magnesium and CVD. She went on to outline the treatment and consequent quality of local water supplies (Kristianstad, Malmo and Uppsala) highlighting where it caused mineral deficiency causing potential health problems – quote “We know about protectiveness of hard water” and “Water is not just H₂O”. She stated that calcium was important for lead passivation. A question from the audience challenge why she was stating a benefit from calcium in drinking water where Kozisek had stated there was no correlation – to which she had to ask Kozicek if that’s what he did say. He confirmed the statement but added that his presentation “generalised” – the significance of his qualification was unclear.

Ashner Brenner^{iv} presented the current trend in Israel for desalination and specifically referred to the need for remineralisation for stabilisation purposes and the WHO activity in investigating remineralisation for both stabilisation and health benefits. He went on to explain that the Israeli committee for MoH standards

for drinking water set alkalinity >80 mg/l as CaCO_3 ; $80 < \text{Ca} < 120$ mg/l as CaCO_3 ; $3 < \text{CCPP} < 10$; $\text{pH} < 8.5$; $\text{LI} > 0$. These were set on the basis of stabilisation but then confirmed to be within the appropriate limits for health benefit from calcium. It has been proposed that magnesium should be set at < 15 mg/l but further studies needed.

Rasic-Milutinovic Zorica^v presented a paper on a study involving 90 blood donors, which showed lowest systolic blood pressure for those living in the area with highest magnesium level in the water supply

The paper by **Ivana Ristanovic-Ponjavic**^{vi} on health risks from domestic RO filters was not presented because of her absence on the occasion. But the abstract purported to inform high levels of compliance with Serbian Regulation (98%), based on waterworks sampling concluding that there is “no reason” for domestic RO filter which could cause adverse health effects from low mineralisation. It recommended setting of minimum values.

Comment During the course of other presentations it became clear that the message of health benefit from calcium and magnesium in drinking water was being acknowledged. However the influence of the dietary intake of these substances was always acknowledged as an important factor in the relevance of the intake via drinking water. In fact, the IWA, which will be taking over responsibility for this activity, publishes “Best Practice Guides” for metals and related substances in drinking water, and is planning a booklet on mineral composition of drinking water – proposed by Rosborg and Kozicek. Ian Pallett and Tony Frost are seeking involvement which may require joining the IWA as individual or corporate members. At a meeting on the Friday evening it was agreed to revise the contents and concern was expressed by many at the relevance of the dietary intake and this should be reflected in the relevant text. A timetable for production of the short monograph was 1st draft 15th Jan 2011, 2nd draft 15th April 2011, meeting to finalise at a Geothermal conference in Czech Republic in June 2011.

2. Arsenic

There were 10 papers (+ 6 posters) on arsenic covering its occurrence internationally (including Europe and the US), treatment complication due to the AsIII neutral valency state, and its health effects.

3. Lead

Colin Hayes^{vii} identified that lead pipework is in use in up to 25% of UK homes and 12 other EU countries have admitted to similar existence with consequent high failure rate for lead compliance. Phosphate dosing controls to within the current lead limit in the UK but with the reduction to 10 $\mu\text{g/l}$ in 2013, compliance will be a challenge. A failure of the EU is that it enforces adoption of regulation but not compliance.

Simoni Triantafyllidou^{viii} described work in the US which demonstrate how galvanic action, when lead pipework is partially replaced with copper (residual lead downstream), can cause much higher lead levels than before the partial replacement.

4. Others

The first conference session was opened with a presentation by **Bob Breach**^{ix} who described the development of water safety plans and the role of stakeholders from source to tap with specific reference to metals. To an audience question about residual hardness minerals, he replied that “consumers in the UK do not like calcium because it causes scale in kettles and heating systems”.

A paper by **P. Andrew Karam**^x described the occurrence of uranium, particularly in Swedish waters, and its toxicity which is more serious as a heavy metal than is radioactive properties.

Other papers addressed sampling with particular reference to tap sampling and complications due to flushing procedures or non-flush sampling and consequent reliability of results. Concerns about nickel and lead contamination were foremost with iron zinc, manganese and copper also very high on the list.

Thomas Rapp^{xi} described the progress made by the 4MS Group (France, the Netherlands, Germany and the UK) in harmonisation of requirements for metallic materials in contact with drinking water.

Larry L. Russell^{xii} described dezincification of brass, its dependence on brass composition, chloride/alkalinity ratio of the water, and brass composition.

Ian Pallett^{xiii} displayed a poster on the SWET trial outlining its background and conduct – but, of course, results are still embargoed.

5. Background

The conference was organised by COST Action 637 and was their fourth international conference on the same subject. The group is chaired by Dr **Colin Hayes**, he was previously chair of the British Water Technical section. For financial reasons, the subject is being taken over by the IWA. The IWA International Water Associations comprises a membership of some 10,000 water international professionals and 400 corporate members representing utilities, regulators, equipment manufacturers, researchers, consultants.

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ⁱⁱⁱ KTH International Groundwater Arsenic Research Institute, Department of Land and Water Resources, Royal Institute of Technology, Stockholm, Sweden.

^{iv} Asher Brenner, Dept. of Environmental Engineering, Ben-Gurion University, Beer-Sheva, Israel.

^v Rasic-Milutinovic Zorica, Department of Endocrinology, Zemun Clinical Hospital, Belgrade, Serbia.

^{vi} Ivana Ristanovic-Ponjavic, Public Health Institute, Belgrade, Serbia.

^{vii} Colin Hayes, Swansea University, UK, Cost Action 637 Chair.

^{viii} Simoni Triantafyllidou, Virginia Tech, Blacksburg VA, USA

^{ix} Bob Breach, Water Quality and Environmental Consultant, previously Head of Quality and Environment, Severn Trent Water

^x P. Andrew Karam, New York City Department of Health and Mental Hygiene.

^{xi} Thomas Rapp, Federal Environment Agency, Bad Elster, Germany.

^{xii} Larry L. Russell, President REED International Ltd, USA

^{xiii} Ian Pallett, Technical Director of British Water (retired), Consultant to British Water and Aqua Europa.